REMARKS

Applicants respectfully request reconsideration of the above-captioned application. Claims 1-4 are currently pending. The claims 3 and 4 are similar to claims 1 and 2, but replace the term "carbon nanotubes" with "electron emitter" to make the claims more generic to triode field emission displays. Also, a minor grammatic error has been corrected at page 1 of the specification.

The Office Action of October 15, 2002, includes a single rejection of claims 1 and 2 under 35 U.S.C. §103 as allegedly being unpatentable over the *Jager* patent (U.S. Patent No. 6,107,733) in view of the *Keesmann et al.* patent (U.S. Patent No. 5,773,921). This rejection is respectfully traversed.

The *Jager* Patent

The *Jager* patent discloses an anode for a flat screen display. Generally, the flat screen display as illustrated in Figure 1 which includes the cathode 1 and a gird 3 which extracts electrons from microtips 2. These electrons are attracted by phosphor element 7 of the anode 5 if these elements are properly biased. See column 1, lines 40-43.

The *Jager* patent adds to this basic design strips 19 and 29 which are biased to a potential at most equal to the minimum biasing potential of the cathode to create an electric field *driving back* the electrons emitted by the microtips. See column 4, lines 23-26. It is said that the strips 19 have a "focusing effect" on the electrons emitted by the cathode toward strips 9 and supported by the phosphor elements, such that the insulating layer 8 remaining between the strips 19 and the phosphor elements are either not bombarded with

negative charges or bombarded charges of extremely low energy. See column 4, lines 27-38. This is said to ensure that insulation is maintained between the strips of the phosphor elements without increasing the thickness of the insulating strips 8. See column 4, lines 39-47.

The *Keesmann et al.* Patent

The *Keesmann et al.* patent is simply cited for disclosing that carbon nanotubes can be used as part of field emission cathodes.

The Hypothetical Combination

Even assuming, *arguendo*, that the *Keesmann et al.* patent would suggest replacement of the microtips 2 of the *Jager* patent with carbon nanotubes, a hypothetical result would nevertheless not meet the recitations of the pending claims. Specifically, the patent discloses *focusing conductive strips* 19 and 29 which repel electrons and provide a "focusing effect" such that electrons impinge on the phosphor elements 9r, 9g and 9b rather than the insulating strips 8.

In marked contrast, the present invention recites, *inter alia, an extraction electrode*. Because the focusing conductive strips of the *Jager* patent are expressly disclosed as repelling electrons, they do not constitute and cannot constitute "extraction electrodes" as recited in the pending claims.

By forming these extraction electrodes which can control the flow of electrons around an anode on a front substrate, a triode FED using carbon nanotubes (an exemplary

form of electron emitter) according to the present invention has a simple structure similar to a diode FED, thereby facilitating manufacture using vapor deposition of carbon nanotubes and allowing control of anode current using extraction electrodes. Therefore, the present invention allows a large FED to be simply manufactured. See page 5, lines 6-21.

It would not be obvious to alter the biasing of the focusing conductive strips 19, 29 of the *Jager* patent to form extraction electrodes insofar as they are designed to provide a

compare FIG 4

electromagnetic field which focuses electrons on to the phosphor. In marked contrast, the present invention uses *extraction* electrodes which can form a triode structure without necessitating the imposition of an additional grid. Hence, the fundamental operation and the result obtained from following the *Jager* patent would not teach or suggest the fundamentally different approach and result obtained by the present invention. Accordingly, it is respectfully submitted that the prior art does not teach or suggest the present invention, and in fact it encourages taking a direction opposite to the direction the present inventors have taken. Accordingly, Applicants respectfully submit that a *prima facie* case of obviousness has not been established and respectfully request that the pending

claims be reviewed and allowed in light of the foregoing comments and the claim recitations. Should any residual issues exist, the Examiner is invited to contact the undersigned at the number listed below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: ______________________

Charles F. Wieland III
Registration No. 33,096

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: January 14, 2003

Attachment to Amendment dated January 15, 2003

Mark-up of Specification

Paragraph beginning at Page 1, line 18

In a conventional field emission display (FED), when a strong electric field is applied through gates to a Spindt's field emitter array (FEA), which is formed of a metal such molybdenum (Mo) or a semiconductor material such as silicon (Si), that is, to microtips arranged at regular intervals, electrons are emitted from the microtips. The emitted electrons are accelerated toward anodes, to which voltage (for example, several hundred to several thousand volts) is applied, and collide with phosphors with which the anodes are coated, thereby emitting light. Because the work function of a metal or a semiconductor material used for the microtips of a conventional FED is large, the gate voltage for electron emission must be very high. Residual gas particles in vacuum collide with electrons and are thus ionized. Because the microtips are [bombard] bombarded with these gas ions, the microtips as an electron emission source may break. Moreover, since particles are separated from the phosphors colliding with electrons and pollute the microtips, the performance of the electron emission source may be deteriorated. These problems may reduce the performance and life of the FEA. To overcome these problems, instead of a metal or a semiconductor material, carbon nanotubes having a low electron emission voltage and an excellent chemical stability is used for microtips. In this case, the performance and life of the FEA can be improved.